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A DISSERTATION

ON

THE FUCUS EDULIS.

BY

AUGUSTUS R. GRIFFEN.

AN ESSAY

ON THE

BOTANICAL, CHEMICAL, AND MEDICAL PROPERTIES

OF

THE FUCUS EDULIS

OF

LINNÆUS.

Submitted, as an Inaugural Dissertation, to the public examination of the Trustees and Professors of the College of Physicians and Surgeons, in the University of the State of New-York, SAMUEL BARD, M. D. President, for the DEGREE OF DOCTOR OF MEDICINE, on the 6th day of May, 1816.

BY AUGUSTUS R. GRIFFEN,

(OF NEW-YORK,)

Licentiate in Medicine of the Medical Society of New-York, and Member of the American Æsculapian Society.

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TO

VALENTINE MOTT, M. D.

Professor of the Principles and Operations of Surgery in the University of the State of New-York; Fellow of the Literary and Philosophical Society; President of the Physico-Medical Society of New-York, &c. &c.

THIS

INAUGURAL ESSAY

IS MOST RESPECTFULLY DEDICATED,

AS

A TRIBUTE TO PROFESSIONAL EMINENCE, AS WELL AS TO PRIVATE FRIENDSHIP AND UNWEARIED PROFESSIONAL INSTRUCTION,

BY

HIS SINCERE FRIEND

AND

GRATEFUL PUPIL,

THE AUTHOR.

TO

WILLIAM J. M'NEVEN, M. D.

Professor of Chemistry in the University of the State of New-York; Fellow of the Literary and Philosophical Society of New-York, &c. &c.

Permit me, Sir, to prefix your name to this Essay, which embraces a subject, the principles and practice of which you so reputably teach, as a mark of the many obligations under which you have placed me.

With sentiments of esteem,

Believe me to be

Yours, &c.

THE AUTHOR.

Henry W. Ducachet,

as a testimony of regard

by The Author

DISSERTATION

ON

THE FUCUS EDULIS, &c.

The genus Fucus belongs to the order Algæ, and class Cryptogamia, of the arrangement of Linnæus.

The word Fucus* is derived from the Latin word Fucare, to dye or paint; some of the seaweeds, or Fuci, being used for this purpose. The species belonging to this genus are very numerous, amounting to some hundreds.

The Fucus Edulis is thus described in the Systema Naturæ of Linnæus: "Caule tereti glabro, ramoso ramulis, confertis erectis, apice bifidus."

This plant is found on the shores of Massachusetts, and on those of the British provinces, in North America. It is, also, an inhabitant of the waters surrounding Great Britain, Ireland, and Scotland.†

* Vide Miller's Gardener's Dictionary, vol. 2.

† I have since been informed, upon the highest authority, that this vegetable is found in the neighbourhood of New-Haven.

In the Nereis Britannica, of Mr. J. Stackhouse, it is described more minutely.

"Frond unbranched, wedge shaped, and succulent; rounded at the top.

Root flat, membranaceous, spreading; throwing up numerous leaves.

Stem roundish, short, expanding soon into a frond. Frond simple, wedge shaped, and rounded at the top, many from a common base of different sizes. Fructification internal; a chain work of annular tubes, as the pellucid mucus appears under high magnifiers, with external, invisible, papillæ.

Seeds very minute.

Mr. Stackhouse observes, "that it is very surprising that this species, which is by no means uncommon on the S. W. coast, should have been so inaccurately, if at all, described. Its specific character is fully sufficient to discriminate it. A reason may be alleged which, in some measure, may account for its not being particularly noticed hitherto, viz. its being very rarely cast on the shore in its perfect state. Its tender succulent texture exposes it to the danger of laceration by storms, and its nutritive qualities to the depredation of fishes. When gathered from its native bed, at the lowest ebb of an equinoctial tide, which I have frequently done, all the longest leaves, and many of the smaller ones, are found either half eaten off, or with the frond perforated in numberless places. This plant affords a no less grateful food to cattle, when accessible to them in its growing state; and the fisherman either chews it raw, or crisps it over the fire. To supply this continued consumption, it not

only throws up at first* a plentiful crop from its wide-spreading base, but is continually† reproducing its leaves. The most surprising quality of this plant, and one that will, probably, render it of service in dying, I discovered by accident. Having placed some of the leaves to macerate in seawater, in order to procure seeds from it, I perceived, on the second day, a faint ruby tint very different from the colour of the plant, which is a dull red, inclining to chocolate colour. Being surprised at this, I continued the maceration, and the tint grew more vivid, till at last it equalled the strongest infusion of cochineal. This liquid was mucilaginous, and had a remarkable quality of being of a changeable colour, as it appeared a bright ruby when held to the light, and a muddy saffron when viewed in the contrary direction."‡

" Little need be added to the specific and detailed descriptions of this singular plant. It is sometimes found

* " I have counted nearly forty leaves from a single disk."

† " It may not be amiss to hint at the surprising power of reproduction, from the base and stems in some species, widely differing from the proliferous tendency at the edges, which many of the larger kinds of Fuci, such as the F. vesiculosus, seratus, &c., possess."

" The inhabitants of Brittany, I am informed, cut these plants twice in the year for manure, and the crop is always abundant. This I am assured of from a French clergyman of veracity."

‡ " This, probably, arose from a mixture of the frond in the liquor. I endeavoured to ascertain its dying powers by the usual methods, without success, as the quantity of tinging matter was not sufficient; though, if attempted at large, and properly evaporated, it might be made sufficiently strong.

" However, an ingenious chemical friend (the Rev. W. Gregor) assures me, that he has produced a fine lake from an infusion of it, by means of alum."

nearly a foot high, and the larger leaves about five or six inches broad at the top, which is usually rounded. Its substance is tender and succulent, of the thickness of neat's leather, but never membranaceous as in the F. Palmatus; its surface shining and polished. Under the outer coloured skin, a pellucid colourless jelly pervades the whole frond. In this, undoubtedly, is the fructification; with a favourable opportunity the seeds may be seen on the surface of the frond, with high magnifiers, either in clusters, or stretched in strait lines, and crossing each other; and, at this stage of the plant, numerous minute tubercles, with perforations at the tips, may be seen, as in the F. Palmatus; but this happens only when it is advancing to a state of decay, or when it has lain a few hours exposed on the sand."* Hab. Menabilly, Fowey; Actor Castle Penzance, &c.

In Smith's English Botany, vol. 19. p. 1307., this plant

* I have placed the F. Dulcis of Gmelin (t. 26.) as a doubtful synonym of this species, from its remarkable wedge shaped frond; and it seems a nearer affinity of this than of the F. Palmatus, to which it has generally been referred. Though the synonyms of Ray, Morrison, and Hudson, are quoted by Gmelin, it is said to have been an inhabitant of the sea of Kamschatka. In addition to the mastication of this and the preceding species, the lovers of Lavor may be gratified with the account of a curious mode of dressing fish in the islands of the Archipelago, extracted from Prof. Gmelin, p. 190. "They take slices of fish, and strew them with crow garlic, chopped small; when tender, some lard, or any animal fat, is added; and, lastly, a handful or more of this F. Dulcis, called by them Marvei, is put on, which not only gives a more beautiful purple tinge to the Ragout, but dissolves and thickens the sauce so much, that when cold, the jelly is strong enough to support a spoon, or other thing, placed in it in a perpendicular direction."

is very accurately described, with a beautiful coloured drawing. He states that it is found in the neighbourhood of Dover, Cornwall, and North Wales; he, himself, had collected it on the Leith shore; but it is less frequent there than the Palmatus, which last (says he) we can confidently assert to be the species most commonly eaten raw at Edinburgh, however preferable that now before us may be for culinary purposes, on account of its more fleshy texture and abundant mucilage. It differs from the preceding, in being thicker and more coriaceous, consequently of a darker hue when held against the light; but it is more particularly distinguished by its obovate, obtuse, undivided form, scarcely cloven or lobed, by no means palmate. Old specimens are very often large, a foot or more in length, and several inches wide, and they are generally found perforated, or eaten away, as it should seem, by marine animals. When masticated, after having been dried, this species more particularly exhales a violet scent, in which, as well as in colour, it shows an affinity to the Byssus Jolithus, of Linn. And, indeed, to our B. Purpurea, v. 3. t. 192.

The Rev. I. Lightfoot* calls it the Fucus Scoticus, and mentions, that the inhabitants both of Ireland and Scotland take pleasure in eating this plant; sometimes they feed upon it like a sallad, when fresh taken out of the sea; but the more usual method is, first to dry it, then roll it up together, and chew it like a plug of tobacco. And this they do more for the pleasure arising from habit than from any supposed virtues in the plant itself. The inhabitants also of the islands in the Archipelago, as we

* Vide Flora Scotica, p. 938.

learn from Steller, are very fond of this plant. They sometimes eat it raw, but esteem it most when added to ragouts, oglios, and such like dainties, to which it gives a red colour. In Mr. Hudson's Flora Anglica* there is no distinction made between this and the F. Palmatus; but I trust that the description given by Dr. Smith, in the Eng. Bot. is fully sufficient to enable the most inattentive observer to draw the line of distinction between them. In 1797, Dr. Goodenough's and Mr. Woodward's paper on the British Fuci, was read before the Linnæan Society of London,† in which they describe seventy-two species. After giving the botanical character of the Fucus Palmatus (the F. Dulcis of Gmelin, p. 189. t. 26.) they thus proceed: "Were not this plant extremely common, and not liable to be confounded with any other, we should think it our duty to draw up an elaborate account of it in all its various forms. Scarcely a plant in nature varies more: as the extremities of the branches usually terminate in something of a palmate form, the essential character is taken from that circumstance. But it must be observed, that it often is very backward in appearing without disguise; oftentimes the branches are lengthened out without any division; sometimes they are merely dichatomous; sometimes the frond is proliferous, so as to lay claim to a place in our first division, foliis distinctis."

"The description of the Flora Scotica perfectly coincides with our own observations. At Weymouth, and elsewhere, we have found it of a perfectly coriaceous substance, as well as the thinnest membrane. We observed

* Vide, p. 769. † Vol. 3. Trans. Linn. Society, p. 164--5.

only in these dwarf coriaceous specimens, the true fructification, which is tubercles immersed in the frond, and projecting from it, and opening at the point. In one of our smallest specimens, a largish tubercle appears standing on the surface of the disk, and not immersed; but these tubercles are rarely to be observed. In general, the plant shoots out to some length; in this state it has only small seeds like granules (the character of an ulva) dispersed over the whole frond, so that one would conclude it to be an ulva.

"May it not happen that, having fulfilled the purpose of its production, viz. the fructification, the growth of the plant accommodates itself to its just limits; but, failing in that, it runs out, wild and irregular, sportive, and impatient of all control?"

We perceive, upon perusing the above remarks, that this seaweed has been, and may now be, confounded with the F. Palmatus: be this as it may, they are possibly varieties only of the same species, and the difference between them is owing to some natural or accidental causes, which, as yet, remain totally secluded from our view. But where the two individuals are found in the same cluster of rocks, exhibiting their respective characteristics, and especially if they could be obtained as they are formed by nature, (not mutilated by marine animals,) it would require but little attention and botanical knowledge to point out the difference between them.

An uninstructed person, upon seeing *paintings* of the two plants, would naturally conclude that they were distinct and separate species.

The reputed efficacy of the Fucus Edulis, in cases to be mentioned hereafter, its novelty as an article of materia

medica, and the circumstance of its being a native of the sea, are the motives which induced me to make the following chemical experiments, in order to ascertain, not only the substances found with, and in it, but thereby the better to enable one to form a correct idea of its modus operandi.

EXPERIMENT I.

Of the F. Edulis, dry, and cut into small pieces, I put 136 grs. into a florence flask, with 8 ounces of distilled water, and subjected it to the heat of a lamp, until it had boiled five minutes: after standing fifteen hours, it was filtered. The colour was of a bright red: taste saline, with the scent of the plant.

a. Oxylate of Ammonia in solution, when dropped into a portion of this, produced a turbidness, and, after standing some time, a small precipitate.

b. Nitrate of mercury rendered it of a milk-white colour, and in a little time a copious flaky white precipitate.

c. The solution of corrosive sublimate had no effect.

d. Neutral acetate of lead precipitated white abundantly, which, in a little time, seemed to incline to redness.

e. Hydrate of barytes threw down a precipitate of a yellowish white colour.

f. Acetate of barytes produced a like precipitate, yet not so immediately, neither so copiously.

After the water had been poured off the leaves, they were found to have parted with the major parts of their colouring matter; and possessed neither taste nor smell in a sensible degree.

EXPERIMENT II.

The same quantity of the seaweed and pure cold water were put into a glass vessel, and allowed to stand for nineteen hours, without the application of heat.

This infusion, when filtered, was not quite as high coloured as that of the preceding experiment, although the smell and taste were similar to it.

a. Pure potassa did not change either this or the decoction.

b. A solution of the nitrate of silver produced an immediate precipitate of a white colour.

c. Ammonia did not alter this, nor the decoction.

d. The solution of the nitrate of barytes cast down a whitish matter, tinged slightly with yellow.

The leaves, in this experiment, lost their smell and taste, as in the first experiment, yet not so much of their colour.

EXPERIMENT III.

A pretty strong infusion of the plant was taken, weighing 1,952 grs. and was put into a dry flask of the weight of 494 grs. This was exposed to the heat of a lamp, until it was boiled to dryness. There remained a brownish mass, having the odour of salt, weighing, with the flask, 525 grs. Hence 1,921 grs. had been lost during the process: $2\frac{1}{2}$ ounces of distilled water were put into the flask, which completely took up the aforesaid materials; the solution assumed a good red colour, possessing the specific gravity of 1,009.75, distilled water being 1,000.

a. Neutral acetate of lead produced a copious curdled precipitate.

b. Nitrate of silver precipitated of a white colour.

c. Muriate of barytes produced a reddish brown in the solution.

d. Oxalate of ammonia destroyed its translucency in the course of an hour.

EXPERIMENT IV.

To 320 grs. of the Fucus there were added 4 ounces alcohol of .859. These were set aside for two and a half days, without the application of heat. When filtered, the transparency of the alcohol was destroyed, and it had a beautiful light straw colour, with a sp. gr. of .872.

a. Nitrate of silver gave a white precipitate.

b. Muriate of barytes did not change it.

c. Acetate of lead, with litharge, threw down a white precipitate, which was soluble in the nitric acid.

EXPERIMENT V.

320 grs. of the dry vegetable were put into 8 ounces of distilled water, and boiled for some minutes, and when cold, were filtered; colour deep red, with a specific gravity of 1,019.50. water being 1,000.

It did not change litmus paper when dipped into it.

EXPERIMENT VI.

320 grs. of the plant, with 8 ounces of pure cold water, were put in a glass vessel, and permitted to rest for three or four hours, shaking the mixture from time to time; when filtered, its sp. gr. was 1,019.50. as in the 5th experiment.

Both these experiments were repeated the following day, and found to be correct.

EXPERIMENT VII.

8 ounces of the leaves were put into a glass vessel, with four pints of cold distilled water, and after standing for fourteen hours it was filtered of a fine red colour. It was then put into a retort, adapted to a receiver, and a gentle heat applied by means of a lamp. After a little time the heat was raised, until one pint and a half was distilled off. Upon examining the receiver, it was found to contain a transparent fluid, with a peculiar smell, not unlike that of the plant. Its sp. gr. was only 1,002.

a. Superacetate, with litharge, when dropped into a little of it, and after standing some time, threw down a white precipitate.

b. Muriate of barytes produced no change.

c. Nitrate of silver, precipitated a white material, very inconsiderable in quantity.

d. Muriate of mercury had no effect.

e. Litmus paper was not changed by it:

f. When dry starch was triturated in this liquor, it became of a white colour uniformly, yet, upon the addition of strong sulphuric acid, heat was produced, but no other effect.

What remained in the retort was put into an earthenware vessel. It had the colour of molasses; when half of this was evaporated gently, the remainder had the specific gravity of 1,119. The heat was continued until it had obtained the consistence of an extract, weigh-

ing 760 grs. It had a brownish red colour, and a taste remarkably saline.

EXPERIMENT VIII.

200 grs. were put into a glass vessel, and 4 ounces alcohol, of the specific gravity of .843, poured on, and the whole well corked. After four days, during which time it was frequently agitated, it was filtered, and had a colour like the tincture mentioned in the 4th experiment. Sp. gr. now .859.

a. It did not change litmus paper put into it.

b. Starch dissolved in it, rendered the whole of a white colour ; to this I added some strong sulphuric acid, when heat was produced with the disengagement of alcoholic fumes. This mixture, in the space of an hour, changed to a black, which, near the sides of the glass, degenerated into red. When this was diluted with cold water, the whole became of its original colour. With the tincture I made the following experiments :

c. The solution of muriate of mercury had no effect.

d. Nitrate of silver, and neutral acetate of lead, had the same effects on this tincture as on the watery solutions of the plant, yet the precipitates were not so abundant.

e. The leaves from which this tincture was made, were afterwards dried and accurately weighed, when it was found that they had lost 15 grs. in the alcohol.

f. I then poured to them 4 ounce measures of cold distilled water, and set the vessel by for forty-eight hours ; at the expiration of which, being filtered,

I dried the leaves a second time in a moderate heat. When weighed, it was discovered that the water had taken up 100 grs.

EXPERIMENT IX.

I took 15 ounces of the dry Fucus Edulis, and exposed it on a clean sheet of iron to the heat of a common forge; when the plate became hot, I put on the plant in small quantities at a time. There immediately arose a thick smoke, which did not affect the eyes like that arising from wood, yet possessing a peculiar smell, which I can compare to nothing except that of burned bread; the heat was continued until it gave out no more smoke, when the process was stopped, and the carbonaceous matter allowed to cool.

a. It was then weighed, and the loss was 11 ounces by the combustion.

b. What remained was put into a glass vase, and three pints of pure cold water added. The next day the whole was thrown on a filter, and distilled water poured on until it came off tasteless; five and a half pints of water were required in the whole proceeding. This lixivium had a tinge of pink, a salt taste, and a sp. gr. of 1,015.

c. The carbonaceous matter that remained on the filter was dried, and the loss of weight was .785 grs.

d. The Lixivium was evaporated in an earthen vessel gently; but before it was totally evaporated, I put litmus paper in, it immediately became green. When it was evaporated to dryness, the saline materials weighed 1,150 grs. They were now put into a glass bottle, and covered, to the depth of an inch, with alcohol of sp. gr. of .838. After standing several hours, during which it was occa-

sionally shaken, the whole was put on a filter, and this washed with a little more alcohol.

This alcoholic solution did not change litmus when put into it. It was then evaporated to dryness, by the heat of a stove, and the saline matter weighed 22 grs. On these I put an equal weight of strong sulphuric acid, which evolved considerable heat, with copious white suffocating fumes, which had the odour of muriatic acid gas. Heat was applied to drive off the excess of acid, and continued to dryness. To this mass twice its weight of pure cold water was added, and, after mixing thoroughly, it was filtered.

An insoluble residue remained on the filter of sulphate of lime. Carbonate of potassa was added to the filtered solution, and there fell down an abundant precipitate of a reddish brown colour, soluble with effervescence in the muriatic acid.

The solution of Prussiate of lime and iron, when added to this precipitate in solution, changed the liquor to a fine green immediately, and, at the expiration of some hours, it let fall á beautiful blue precipitate.

e. The salts that remained on the filter, and insoluble in alcohol, were dried, and they weighed 1,013 grs. To these about eight times their weight of water was added, which dissolved the whole. This was filtered, and put into a vessel to evaporate; while the evaporation was going on, and when very concentrated, I found that it would turn litmus paper green.

f. Before the solution had evaporated, and while it was yet quite hot, it let fall a great number of crystals of a cubic form, which, when the sulphuric acid was poured on them, gave out the white disagreeable fumes of the

muriatic acid gas. These crystals remained permanent in the open air. They had the taste of common salt, yet rather more acrid, and were not changed when the nitric, acetic, and muriatic acids were poured on them. These saline particles weighed 150 grs.

The solution, in which the above salts were dissolved, was taken off the sand bath at this time, and allowed to evaporate spontaneously, which was completed in one week; yet I should observe, that some of the lixivium was taken, and these tests added.

g. Hydrate of barytes precipitated copiously a yellowish white.

h. Hydrate of lime threw down a white precipitate. These precipitates were both soluble, with effervescence, in the sulphuric and muriatic acids.

The salts spoken of above, by spontaneous evaporation, weighed 550 grs., and were deliquescent. I poured 5 ounces alcohol, of .838, on them, and, after standing some time, filtered, washing the filter with alcohol. With this alcoholic solution I made these trials; viz.

a 2. They slightly greened the litmus exposed to their action.

b 2. A stream of carbonic acid gas did not produce a change when passed through the solution.

c 2. It was not altered when ammonia in solution was added.

d 2. Oxalate of ammonia turned it of a milk-white colour, and, after a little time, an abundant whitish precipitate was separated, insoluble in the nitric and muriatic acids.

e 2. Strong sulphuric acid precipitated considerable of a yellowish white, with the disengagement of alcoholic

fumes; this precipitate was soluble in pure water, but not in muriatic acid.

f 2. Nitrate of silver threw down a copious curdy precipitate, insoluble in strong sulphuric acid.

g 2. A solution of carbonate of potassa produced no effect.

h 2. Muriated barytes produced a cloud in the solution. The precipitate, occasioned by the oxalate of ammonia,(*d* 2.) was exposed to a heat sufficient to drive off the acid in combination; it was redissolved in muriatic acid; heat then applied until dry; this, when dissolved in water, gave no precipitate with the oxalate of ammonia.

i 2. The remainder of the alcoholic solution was evaporated, and distilled water added when heated, and a solution of carbonate of potassa put into it; the vapours of ammoniacal gas were distinguishable plainly.

k 2. Oxalate of ammonia produced no effect on it. When pure potassa, in solution, was held over the vessel containing this salt, then arose the white fumes of muriate of ammonia.

A portion of the deliquescent salts, spoken of in p. 23, before the alcohol was added to them, was put into a glass vessel, and sulphuric acid added, which decomposed it, and caused the muriatic fumes to appear; heat was applied to expel the excess of acid; when dry, the mass was very sparingly soluble in water, from which I conclude that it was the sulphate of potassa.

What remained on the filter, after alcohol had taken up what it would, was found to be the muriate of soda principally, mixed, perhaps, with a little of the muriate of potassa.

OBSERVATIONS ON THE EXPERIMENTS.

IN THE FIRST EXPERIMENT.

a. Detects a small portion of lime in the decoction.

b. Proves the presence of a muriatic salt.

d. Shows the presence of mucilage.

e. and *f.* Ascertain that it contained the sulphuric acid, yet not free.

IN THE SECOND EXPERIMENT.

a. Would have detected a free acid had there been any.

b. Precipitated a muriatic salt, beyond a doubt.

IN THE THIRD EXPERIMENT.

The object, in the first place, was to discover how much of the solution could be driven off by a heat of 212° Farenheit. The tests afterwards applied, showed the fixed substances in the solution.

IN THE FOURTH EXPERIMENT.

a. Denoted that some muriatic salt had been taken up by the alcohol.

b. Would have indicated the presence of the sulphates.

c. Seemed to have argued the presence of mucilage.

IN THE FIFTH AND SIXTH EXPERIMENTS.

The specific gravity of the cold infusion, and of the decoction, being equal, would induce us to believe that cold water would take up as much of the plant soluble in water as hot. From the rule laid down by Mr. Kirman, we would expect to find in every 1000 grs. of these two solution 27.00 grs. of saline materials.

Yet the mucilage in this liquor, independent of the salts contained in it, would deceive us in the above opinion, as it is well known that viscid liquors have a greater specific gravity.*

a. Would lead us to believe that a free alkali was present.

IN THE SEVENTH EXPERIMENT.

We have the nature of the materials which came over into the receiver upon moderate distillation.

b. Did not detect the presence of sulphuric acid.

c. Rendered it probable that muriatic acid had come over.

d. Proved, beyond a doubt, that neither an alkali nor acid had come over free.

f. Satisfactorily proves that it did not contain the peculiar substance called iodine, discovered by Prof. Davy. And in this place permit me to state my unbelief as to its presence in this Fucus; at least, I could not discover it in the various trials made (which are not related in the experiments) for that purpose.

* This would be true where the specific gravity was taken by immersing a ball in the fluid; yet in this case it was done by weight.

In a Memoir on the combinations of iodine with different vegetable and animal substances, by Messrs. Colin and Claubry, published in Paris, 1814, we find the following assertion :* " Quand on met en contact, à froid, l'iode et l'amidon, secs, en triturant le mélange, l'amidon prend d'abord une teinte violâtre qui passe au bleu ou au noir, selon la quantité d'amidon et d'iode employée ; la couleur est rougeâtre si l'amidon domine, d'un bleu superbe si ces substances sont en proportions convenables, et noire au contraire quand l'iode est en excès ; en sorte que l'on pourra obtenir des violets de nuances très-différentes selon qu'il y entrera plus ou moins de la couleur bleue ou de la couleur rougeâtre." Again, we find in an inaugural dissertation, entitled Researches on the Existence of Iodine in Sea Water and the Varecks, by Mons. Claubry, published in 1815,† he says, " Quand on verse cet acide (the sulphuric) sur la liqueur où l'on a mis de l'amidon, il se produit une belle couleur bleue." And, in page 14, he remarks the same thing of the tincture of the Fucus Saccharinus. I took some of the tincture spoken of in Experiment 8, and put into it some dry starch ; after triturating the mixture well with a glass rod, I added some sulphuric acid, which disengaged alcoholic fumes with heat, and the liquor in a little time turned of a reddish tinge, as mentioned in the first quotation, if the starch be in minor proportion. Thinking I had not used the starch in sufficient quantity, I added more, and pretty soon there was evolved a good black colour. I have since repeated this experiment, not only with the tincture, but also the watery solutions, several times, yet

* Page 8. † Page 11.

could never obtain a good blue, or even any blue, but constantly a red, and from this to black, exactly resembling the mixture of a solution of starch and sulphuric acid.

g. This liquor, whose specific gravity was 1.119, ought to contain 166.6 grs. of Saline particles in every 1000, or 16.66 in every 100 grs. The extract weighed 760 grs.; but it is necessary to observe, that two thirds only of the solution were used for this process; hence it is probable, that if the remaining one third had been evaporated, the total amount of extract obtainable from 8 ounces of the dry F. Edulis, would be about 1000 grs.

IN THE EIGHTH EXPERIMENT.

Here we have the alcohol stronger than in the first tincture.

a. By this it appears that no free acids and alkalies were taken up.

b. Proves the absence of Iodine in this tincture.

d. Indicates that it contained muriates, but not so much in quantity as water will take up.

e. Shows the amount of materials taken up by this menstruum.

f. Gives the greater power water possesses over alcohol in acting on this plant; water taking up nearly, or quite, one half, while alcohol will scarcely dissolve one thirteenth; yet, if one should use heat in making the tincture, I am well persuaded that these proportions would be lessened very much.

IN THE NINTH EXPERIMENT.

a. Gives the quantity of fugacious matter contained in nearly one pound avoirdupois of the Fucus Edulis.

b. Shows the quantity of water employed in dissolving the contained salts, in 4 ounces of the residue of combustion.

c. Demonstrates that this lixivium contained an alkali; yet, whether this was the effect of combustion, or contained in the plant before this process, remains still to be determined. For my own part, I would attribute its presence to the former cause; for this reason, that it could not be found either in the decoctions, cold infusions, or tinctures, as one can easily satisfy himself of by referring to the 5th, 6th, 7th, and 8th experiments. We observe, also, that the carbonaceous matter lost 785 grs. in filtering the lixivium; now, one would certainly expect to find a saline mass, when this was evaporated to dryness, equal, but not greater than this weight, yet the salts did amount to 1,150 grs. Where did the addition of 365 grs. come from? It will be recollected, that the residue of combustion was exposed to a red heat, which must have driven off the water crystallization; add to this that the heat applied in evaporating the lixivium was very moderate, so that not only the water of crystallization was retained in these last crystals, but also a portion of moisture.

d. This circumstance would induce us to believe, at first, that 137 grs. of saline particles were taken up by the alcohol; yet this is not correct, as we shall be convinced of, when looking into Mr. Kirwan's essay on mineral waters, p. 164, 5. "The usual practice is to weigh

the saline mass left after evaporation, before and after treating it with spirit of wine, in order to judge, by the loss of weight, how much had been taken up by the spirit, see Bergm. p. 181, 5 Fourcroy, p. 127, and 1 Westrumb, heft, p. 119 and 120. Now, it is easily seen, that the difference of weight can decide nothing in this case, unless the degree of dessication before and after the treatment with spirit of wine be exactly the same, which can never be expected to happen, not only because the same degree of heat cannot be exactly attained, nor the saline mass exposed under exactly the same surface, but, also, because the salts that remain after the action of the spirit of wine, retain water much less powerfully than those which the saline mass contained before it was exposed to that menstruum. Nor can this inconvenience be remedied by weighing the contents of the spirituous menstruum after its evaporation, for these will be often found to weigh more than the spirit had really taken up, because it deposites its contents in a crystallized state, which, nevertheless, it had taken up, deprived of their water of crystallization; and this is particularly observable where muriated magnesia is concerned, as Fourcroy has well remarked, "Analyse d'Eughhiem," p. 284.

e. This did not take up a free alkali, and neither did the salts, upon evaporation, weigh 137 grs., but only 22. This proves the correctness of Mr. Kirman's observations. By the application of sulphuric acid to these dry salts, the muriates were decomposed, and their acid driven off. By adding, afterwards, double their weight of pure water, the sulphate of magnesia in small quantity was taken up. This proves that the alcohol has taken up the muriate of magnesia.

The insoluble sulphate of lime indicated that the muriate of lime was also in the alcoholic solution.

By adding the carbonate of potassa to the filtered solution, the sulphuric salt was decomposed, and the test then applied to this ascertained it to be iron.

f. These crystals were undoubtedly the muriate of soda, from their shape, taste, and the circumstance of their forming when the solution was quite hot.

As a farther proof of their being the muriate of soda, we have to attend to the effect of acids, and to test it.

g. and *h*. Would go to prove that this liquor contained a carbonate of soda in all probability, as this plant is used among the other seaweeds to make Barilla.

f 2. Proved that the muriate of something was the chief salt in this liquor.

g 2. Showed that it was not the muriate of soda.

k 2. *l* 2. Demonstrated that it was the muriate of ammonia beyond a question, yet, had the heat been continued longer, and raised higher in the combustion in the first place, we should not have found this salt at this period, but it would have been driven off as in the analyses of the F. Saccharinus, made by Mons. Claubry.

From these experiments, I conclude, the salts contained in the plant, or rather in the solution, are the following:

Muriate of soda.

Sulphate of soda; yet this last, if it did exist, was in too small a proportion to be separated by itself.

Muriate ammonia.

——— magnesia in small quantity.

——— lime.

——— potassa.

Carbonate of soda.

——————— iron,

which, in all probability, gives colour to the plant. Beside these, it had mucilage, and a peculiar vegetable principle. The proportion of these salts in this vegetable are not set down; but at a rough calculation, we may say, that the muriate of soda amounted to about one half of the whole, and of the carbonate of iron, and sulphate of soda, the proportions became very minute indeed. The other salts bore a pretty regular ratio, with respect to each other.

Medicinal Properties of the F. Edulis.

We have no author, as far as I can discover, either ancient or modern, who has recommended this seaweed in any disease; nor can I find it enumerated in any work, as an article of the materia medica. Yet, strange as it may appear, this marine plant, in some of our Eastern States, is esteemed as one of the best vermifuges among them. It is also as much in vogue in Annapolis Royal (N. S.) as the pinkroot is in this city, as a remedy for worms. "It is sold in the streets of Dublin, being dried; and is said to sweeten the breath, and to kill worms."*

The following copy of a letter I received from a merchant in this city, who is a native of Annapolis.

New-York, April 9th, 1816.

DEAR SIR,

At your request, I will endeavour to sketch an outline of the nature and virtues of the Dulse, as it is called. In my youth, I was a resident of Annapolis Royal, and was

* Vide Miller's Gardener's Dictionary, vol. 2.

subject, as were the rest of my companions, to those disagreeable animals, *worms;* but although we had them frequently, it was in our power to subdue them at pleasure. By what means it was known among us, that the Dulse was a certain remedy for them, I shall not undertake to determine; neither do I recollect who was the discoverer of the place in which we found the plant; (for I knew of but one;) however, this fact I am very sure of, that when any of my schoolmates were under the influence of worms, they would go to the Dulse pond, as regularly as those of maturer years would consult a physician for any painful disease. The time we chose, was as near low water as possible, on account of the difficulty of getting at the weed at any other time. We found it attached to the rocks, growing, generally, to the height of a foot or more, and in appearance, as to shape and colour, resembled very much the figure in Smith's English Botany. We not only consumed this vegetable on account of disease, but when there was no school for a day, and we wished to spend our time to the best advantage, we would take our recreation in the neighbourhood of the above pond, and when hungry, instead of going to our respective houses for food, we would fall to and make a dinner of Dulse in its raw state, as if we were eating the best of dainties. Had this remedy been but used once, and its effects witnessed as often, I would be guarded as to my opinion concerning its efficacy, yet the numberless instances in which its specific power has been witnessed by myself and others, lays me under many obligations to this simple vegetable, which I cannot repay more conscientiously than by recommending its use to those who, while they gratified a laudable

curiosity, would at the same time give ease and health to those afflicted with a disease, which frequently terminates existence.

I am, sir, yours, &c.

The efficacy of the Fucus, as a vermifuge, may be seen in the following cases, which were obligingly furnished by a professional friend.

Miss C——, aged 12 years, of a delicate habit, having been affected with symptoms indicative of worms, such as constant fever, restless nights, offensive breath, and violent pain in the bowels, two days after taking castor oil, she took at three draughts, in the course of the day, a pint of the infusion of the Fucus Edulis, made with an ounce of the leaves. On the following morning, after a small dose of oil, she passed an ascaris lumbricoides about four inches in length; and the symptoms before complained of disappeared.

In another instance, a gentleman, after eating a quantity of it, got rid of five worms.

In a third case, after eating it, a lady voided one.

And, lastly, a girl, by taking some of it, passed five.

I have used this Marine Plant in cases of worms. The first was a female of about forty-five years of age, who informed me that she was frequently affected with worms, and that the use of gentle remedies generally relieved her: I gave her one ounce of the dried plant, with directions to make a tea with about a pint of water, which she might drink at pleasure. The medicine, in this case, was attended with good effects, (bringing away numberless worms, which, by her description, I concluded to belong to the class Tænia,)

although she took but one half of the dose. The remainder was administered to a coloured child in the kitchen, who had been complaining of symptoms for some time past, indicating worms. The little sufferer was restored to health by evacuating a worm as large as one's little finger.

These two cases are the only instances in which I have given the Fucus Edulis, except in the case of a young Miss of 10 years, who had been ill for some months, and was supposed by her mother to be troubled with worms; she had been taking medicines from the family physician with this idea, to no purpose. I gave her two doses of the Dulse, which did not give much, if any, relief; the mother then coincided with me that we had all mistaken the disease, which proved true, for the patient recovered gradually, when taken into the country, without passing a worm.

Do the vermifuge properties of this plant reside in any peculiar principle, or upon the salts which it contains? The vulgar adopt the former opinion, and account for its action by supposing that the worms eat the Dulse, and are killed by some deleterious principle entering into its composition. I think that there is no necessity for the above supposition, and that the knowledge of the individual salts, found upon analysis, would induce a reasonable mind to impute its efficacy to these and the mucilage with which it so plentifully abounds.

In the employment of this Fucus as an anthelmintic, I would advise the practice of making a tea, by taking one ounce of the plant, and infusing it in a pint of water, and this may be consumed in the course of a day.

There are two things in this plant which we do not find in other vegetables possessing vermifuge properties, and which would go no small way in its use among children, viz. The agreeableness of the taste of the tea, and its colour, which resembles red wine.

In those States where the Fucus Edulis can be procured fresh from its attachments to the rocks, the necessity of making a tea could be dispensed with, and the plant might be used as in Nova Scotia; i. e. eaten raw.

FINIS.